Fisheries

Management Indicator Species Report:

Trinity Alps Wilderness Prescribed Fire Project

Shasta-Trinity National Forest

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1. Introduction

The purpose of this report is to evaluate and disclose the impacts of the Trinity Alps Wilderness Prescribed Fire Project (the Project) on fisheries Management Indicator Species (MIS) identified in the Shasta-Trinity National Forest (STNF) Land and Resource Management Plan (LRMP) (USDA Forest Service 1995). This report documents the effects of action and no action alternatives on the habitat of selected fish MIS. Detailed descriptions of the Project alternatives are found in the Project Environmental Analysis.

The STNF LRMP identifies three fish assemblages (USDA Forest Service 1995, Pages 3-11) and five fisheries management indicator species selected to represent those assemblages. Winter-run steelhead, spring-run Chinook salmon and summer steelhead represent the anadromous fish assemblage; rainbow trout represents the coldwater inland fish assemblage; and, largemouth bass represents the inland warmwater fish assemblage.

Project-level effects on management indicator assemblages are analyzed in this document and separately disclosed as part of the environmental analysis under the National Environmental Policy Act (NEPA). The Forest Service manages fish populations to maintain viable populations of wild, native fish (rainbow trout, salmon and steelhead) or to enhance fish populations of wild or introduced (largemouth and smallmouth bass) species. The Forest selected management indicators to ensure that viable populations of these species are maintained.

Management indicator assemblage habitat trend is monitored using historic fish habitat surveys, watershed condition class modeling and baseline assessment using the Shasta Trinity National Forest Tributaries Matrix of Factors and Indicators as revised by the STNF Level 1 team (Appendix A). Analyzing project effects to these aquatic species and assemblages also provides information about aquatic habitat including water quality (sediment loading and temperature), water quantity (base and peak flows), and access to spawning and rearing habitat (un-restricted access to aquatic habitat).

Population data for MIS is limited; however, available information is obtained from State and Federal agency partners including the California Department of Fish and Game, National Marine Fisheries Service (NMFS), the U.S. Geological Survey, and USDI Fish and Wildlife Service.

2. Project Level Management Indicator Assemblages

Fisheries assemblages and species for the STNF are identified in the LRMP (USDA Forest Service 1995, page 3-11). The management indicator assemblages analyzed for the Project were selected from this list, as shown in Table 1, which identifies assemblages, categorizes them relative to effects of the Project, and lists the representative species.

The MIS whose habitat could be either directly or indirectly affected by the Project, identified as Category 3 in Table 1, are carried forward in this analysis. In summary, the management indicator assemblages and representative species selected for project-level analysis for the Project are:

- Anadromous Fish Assemblage: Spring-run Chinook salmon and Steelhead
- Inland Coldwater Fish Assemblage: Resident Rainbow Trout

Table 1. Management Indicator Assemblages and Selection of Representative Species for Project-Level Analysis

Management Indicator Assemblages	Selected Assemblage Representative	Category for Project Analysis
Anadromous Fish Assemblage	Steelhead: winter and summer-run	3
Anadromous Fish Assemblage	Spring-run Chinook,	3
Inland coldwater fish assemblage	Rainbow Trout	3
Inland warmwater fish assemblage	Largemouth Bass	1
Category 1: Management indicator assemblage whose habitat is not in or adjacent to the project area and would not be affected by the project. **Category 2**: Management indicator assemblage whose habitat is in or adjacent to project area, but would not be either directly or indirectly affected by the project. **Category 3**: Management indicator assemblage whose habitat would be either directly or indirectly affected by the project.		

Largemouth bass, identified as Category 1 will not be further discussed because habitat for the warm-water assemblage will not be directly or indirectly affected by the Project. No species were identified as Category 2.

Summer and winter-run steelhead have similar habitat and biological requirements and are addressed collectively as "steelhead" in this report.

3. Description of Proposed Project

The proposed activities are located in the northwest corner of the Trinity Alps Wilderness. The project area comprises approximately 11 percent of the entire wilderness – approximately 58,350 acres. Alternative 2 (the proposed action) includes a combination of aerial ignition and, where feasible, hand-lighting of prescribed fires on approximately 16,709 acres within the project area. Alternative 3 includes all of the proposed treatments under Alternative 2 and an additional 2,379 acres in the Virgin Creek drainage for a total of 19,088 acres. The overall goals of the Project are to: 1) reduce the risks and consequences of wildfire occurring within the wilderness or escaping from the wilderness; 2) create a fuels condition that enables the use of minimum impact suppression tactics that make use of natural barriers, topography or watercourses; 3) permit lightning-caused fires to play, as nearly as possible, their natural ecological role within wilderness; and 4) reduce the risks and consequences of public health and safety concerns created by hazardous air conditions.

Minimum Impact Suppression Tactics (National Wildfire Coordinating Group 2003) and Forest Service Manual (FSM) 2324.23 direction for fire management activities in wilderness would be followed during all phases of implementation. In accordance with these two guides, the Forest Service would employ methods that cause the least amount of disturbance or alteration of wilderness characteristics that can be used safely and effectively to implement the proposed action.

The 5th-field and 7th-field watershed names and hydrologic unit codes (HUC) where Project activities would occur and treatment acreages are shown in Table 2.

Table 2. Trinity Alps Wilderness Prescribed Fire Project area 5th - and 7th - Field Watersheds and Hydrologic Unit Codes (HUC)

	HUC	Watershed Acres	Total Acres Proposed for Prescribed Fire Treatments	% of Watershed Proposed for Prescribed Fire Treatments	Acres of Riparian Reserves Proposed for Prescribed Fire Treatments
5th Field Watershed					
New River	1801021110	149,365	19,064*	13%	4,506
7th Field Sub-Watersheds					
Eightmile Creek	18010211100101	6,967	1,328	19%	202
Sixmile Creek-Virgin Creek	18010211100102	9,525	5,050	53%	1,383
Lower Slide Creek	18010211100203	8,254	1,525	18%	418
Twomile Creek-Virgin Creek	18010211100103	7,506	3,000	40%	741
Barron Creek-Caraway Creek	18010211100402	10,587	2,706	26%	526
North Fork Eagle Creek	18010211100201	7,697	4,299	56%	1,063
Eagle Creek-Slide Creek	18010211100202	10,056	1,150	11%	173
Quinby Creek	18010211100401	5,630	6	<1%	0

Not all 7th-field sub-watersheds within the New River 5th-field watershed are within the assessment area. This table displays only those 7th –field watersheds that contain project actions.
* Actual proposed treatment acres under Alternative 3 are 19,088 - the discrepancy is due to the nature of the hydrologic unit data layer as it overlays the project area.

A more detailed description of Alternative 3 can be found in the Fisheries Biological Assessment/Biological Evaluation (Fisheries BA/BE) prepared for the Trinity Alps Wilderness Prescribed Fire Project. Project proposed actions include the following primary project elements:

- Prescribed Fire Treatments
- Existing Trail and Fireline Maintenance
- Danger (Hazard) Tree Removal

Design features applicable to all actions include BMPs, Wet Weather Operation Standards (USDA Forest Service 1999), STNF Forest Plan soil cover standards and Standards and Guidelines, and other Resource Protection Measures (refer to the Fisheries BA/BE). Application of these measures will minimize the impacts of each action on aquatic resources considered herein.

Maps in Appendix A of the Fisheries BA/BE show the locations of all proposed actions and show resident trout and anadromous salmonid habitat in the assessment area.

4. Environmental Baseline

Chinook salmon (*Oncorhynchus. Tshawytscha*), steelhead trout (*Oncorhynchus mykiss*), and resident rainbow trout (*O. mykiss*), are indicators of perennial streams with good water quality, clean substrates

that provide spawning and rearing habitat, adequate stream flows, in-stream large woody debris, and resilient channel conditions.

The distribution of steelhead was used to determine the extent of habitat for Chinook salmon and this is referred to as anadromous fish habitat. Rainbow trout occur in all anadromous fish habitat and also occur beyond the range of anadromous fish in Eightmile Creek, Sixmile Creek-Virgin Creek, North Fork Eagle Creek, Eagle Creek-Slide Creek, and Quinby Creek. Table 3 displays the miles of anadromous fish habitat and miles of rainbow trout habitat within the Project area by 7th field watershed.

Table 3. Stream miles of anadromous fish habitat / Coho Salmon Critical Habitat and rainbow trout habitat by subwatershed.

7th Field Watersheds	HUC	Miles of Coho Salmon Critical Habitat	Miles of Additional Rainbow Trout Habitat
Eightmile Creek	18010211100101	2.9	2.7
Sixmile Creek-Virgin Creek	18010211100102	8.0	0.6
Lower Slide Creek	18010211100203	8.7	0.0
Twomile Creek-Virgin Creek	18010211100103	9.5	0.0
Barron Creek-Caraway Creek	18010211100402	5.0	0.0
North Fork Eagle Creek	18010211100201	0.7	3.9
Eagle Creek-Slide Creek	18010211100202	6.0	1.8
Quinby Creek	18010211100401	0.0	0.5
		40.8	**9.5**

The project area streams are located within the New River 5th –field watershed, a tributary to the Trinity River. The New River watershed is identified as a Tier 1 Key Watershed in the Northwest Forest Plan. These watersheds serve as refugia for maintaining and recovering habitat for at-risk stocks of anadromous salmonids and resident fish species and provide high quality water. Streams within the project area exhibit relatively steep gradient and are primarily sediment transport reaches. Existing baseline conditions for the New River watershed have been summarized based on an analysis of watershed indicators as detailed in the Fisheries BA/BE as well as within the New River Watershed Analysis (USDA Forest Service 2000), incorporated herein by reference. All baseline indicators are rated as “properly functioning” except large woody debris, off-channel Habitat, floodplain connectivity and disturbance regime, which are rated as “at risk”.

Checklists within the Fisheries BA/BE document habitat conditions for anadromous salmonids in the project area and the Fisheries BA/BE provides a detailed analysis of effects to habitat elements. Rainbow trout have essentially the same stream habitat requirements as anadromous salmonids including cool water, clean gravel for spawning, cobble and boulder substrate for velocity refuge and cover, large woody debris for cover and habitat complexity, and other diverse habitat elements including deep pools, riffles, cascades and side channel habitat. These habitat elements provide adult and juvenile fish with cover and protection from predators, oxygenated flows, provide juvenile rearing and foraging habitat and adult holding and foraging habitat, and provide spawning habitat that is critical to sustain healthy populations of anadromous fish and rainbow trout species.

The Trinity River is the largest tributary of the Klamath River and provides habitat for steelhead and Chinook salmon. Resident rainbow trout, green sturgeon, coast range and prickly sculpin, speckled dace, three-spine stickleback, and Pacific lamprey also occur there. Approximately one fourth of the watershed area is above Lewiston Dam. The Bureau of Reclamation exports Trinity River waters to the Sacramento River through the Trinity River Division (TRD) dam operations. The beneficial uses associated with cold water fish habitat are currently impaired in the Trinity River Basin. Habitat degradation, exacerbated by human activates, has contributed to a dramatic decline in the populations of salmon species and steelhead trout from historical levels. The reduction in quantity and variability of mainstem flows following dam construction, coupled with an accelerated rate of sediment delivery due to intensive management practices in tributaries, resulted in an imbalance in the sediment budget and a reshaped channel (McBain and Trush 1997). The once diverse channel was converted into a structurally uniform channel.

The Trinity River Total Maximum Daily Load (TMDL) (EPA 2001) for Sediment is established in accordance with Section 303(d) of the Clean Water Act because the State of California has determined that water quality standards for the Trinity River are exceeded due to excessive sediment. Sediment-related changes include loss of coarse sediment supply from the upper basin (due to blockage by the dams), reduction of spawning gravels and cobble channel margins in the mainstem below Lewiston Dam to the confluence with Rush Creek. Gravel deposits in the tails of pools and runs, often preferred spawning habitat, are subject to frequent scour during high flow events. Lewiston and Trinity Dams completely cut-off the upstream source of coarse bed material to replace bed material transported downstream. The mainstem immediately below Lewiston Dam (approximately to the confluence with Rush Creek) has responded with slight down-cutting and significant channel bed coarsening (USFWS and Hoopa Valley Tribe 1999).

Further information on existing conditions for sediment and water temperature in the Trinity River Basin is also contained in the following water quality management plan developed and approved by the Environmental Protection Agency (EPA), and is incorporated herein by reference: Trinity River Total Maximum Daily Loads for Sediment (EPA 2001).

Status and Trends

Resident Rainbow Trout

Population estimates for resident rainbow trout in project area streams are lacking. The U.S. Forest Service does not routinely conduct population estimates or manage fish populations per se, but rather manages habitat on National Forest System lands for these species. Population surveys from the California Department of Fish and Game are not available. The distribution of resident rainbow trout and anadromous salmonids are shown on Project maps (Appendix A in the Fisheries BA/BE). Adult and juvenile trout have been observed in most project area perennial streams. Based on field observations and limited survey data, the limiting factors for trout in the project area appears to be low summer base flows, steep gradients and low amounts of spawning gravels.

Steelhead Trout

Refer to the Fisheries BA/BE for information on the biological requirements and life history of Klamath Mountains Province (KMP) steelhead, as well as more detailed status and trend information.

In the Klamath basin, summer steelhead utilize Red Cap, Bluff, Elk, Dillon, Clear, Wooley, and Canyon Creeks and the Salmon, North and South Fork Trinity and New Rivers. These rivers drain portions of the Klamath and Trinity Mountains providing deep pools for refugia through the summer for subadults to

mature sexually. Nielsen and Lisle (1994) found coldwater pockets in these thermally-stratified pools to be 3.5°C cooler than midday ambient stream temperatures of 29-36°C. In the New River, summer steelhead were found to occupy covered areas under bedrock ledges and boulders. Densities of these fish were highest where water velocities averaged 9.3cm sec-1 (Nakamoto 1994).

In the 16 years between 1989 and 2004, counts of adult summer steelhead in the South Fork Trinity River averaged 41 fish annually, ranging from 8 fish in 1991, to 95 fish in 1997 (CDFG 2004a in USDA Forest Service 2008, see Figure 1). No long-term data is available to evaluate Klamath River basin steelhead population trends. An unpublished report estimated a basin wide annual run size of 283,000 adult steelhead (spawning escapement + harvest) in 1965. The primary factors impacting steelhead in the Klamath Basin include hatcheries, harvest, hydroelectric operations, and human impacts. Recent surveys indicate that summer steelhead numbers in the South Fork Trinity River have remained relatively steady or have slightly increased.

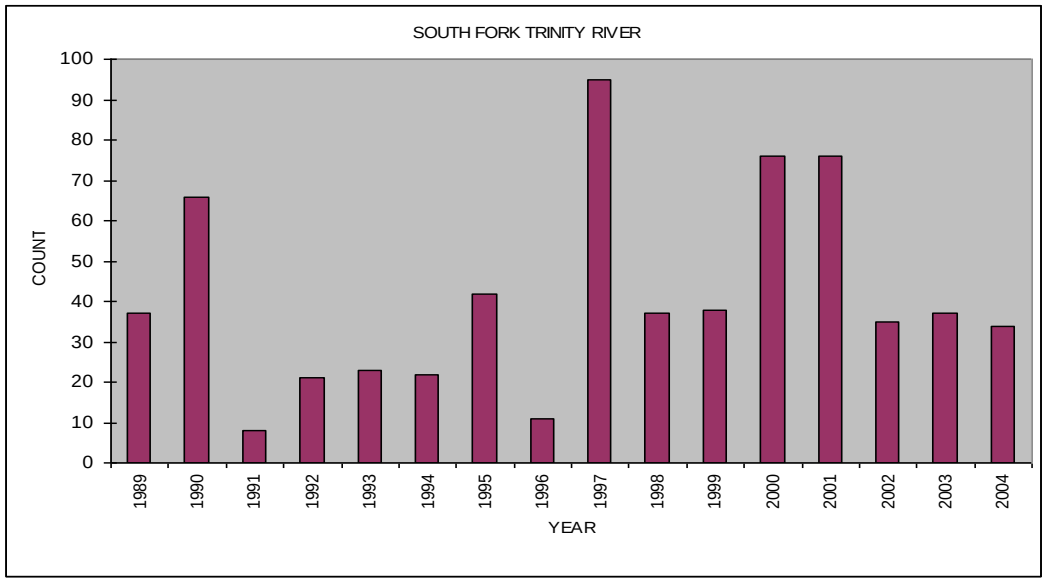
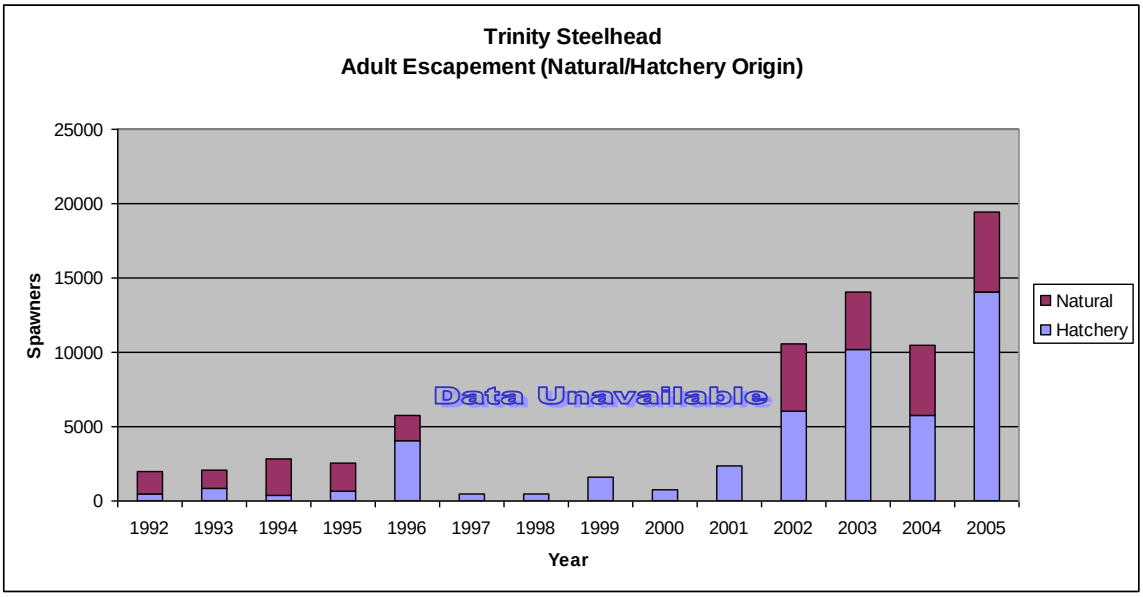


Figure 1. Adult Summer Steelhead Counts in the South Fork Trinity River, 1989-2004

The following information is summarized from a NMFS Biological Review Team re-evaluation of KMP steelhead (NMFS 2001) and more recent estimates of adult escapement in the Trinity River provided by the Hoopa Valley Tribe Fisheries Department (unpublished data on file).

NMFS (2001) reported that overall trend data for summer steelhead in the KMP steelhead ESU is mixed. In tributaries to the Klamath River, summer steelhead numbers remained low in the 1990s but increased in 2000. Similar abundances for the South Fork Trinity River and Hayfork Creek also indicate modest increases in the late 1990s to 2000, although the total number counted remains low. Summer steelhead populations in the New River appear to be relatively stable. Estimates of the total number of fall-run steelhead in the Trinity River, based on the natural component of the run and escapement of natural fish based on counts at the Willow Creek Weir suggest an upward trend in the run-size and escapement of natural fish in the 1990s. Catch records for the Klamath River indicate a similar upturn in catch (and release) of naturally spawned winter-run steelhead beginning in 1997. Data from the Willow Creek Weir on the Trinity River indicated that hatchery fish comprise 20-70% of steelhead moving upstream during the weir's operation.

The Hoopa Valley Tribe Fisheries Department provided estimates of adult steelhead escapement from 1992-2005 (Figure 2; unpublished data on file) indicating a gradual increase in overall abundance and modest increases in naturally produced steelhead (1993 had the lowest abundance and 2005 had the



greatest abundance).

Figure 2. Trinity River Steelhead Adult Escapement Estimates from Hoopa Valley Tribe Fisheries Department (unpublished data)

Spring-Run Chinook Salmon

Spring-run Chinook salmon are included with fall-run and late-fall-run Chinook salmon in the Upper Klamath Trinity (UKT) Evolutionarily Significant Unit (ESU) because of genetic similarities (Meyers et al. 1998). In the Klamath drainage, the principle run is in the north and south forks of the Salmon River and in Wooley Creek, tributary to the Salmon River (Moyle 2002). The North and South Fork Trinity River, and possibly New River, also support a small number of Chinook salmon (CDFG 1990, in Moyle 2002).

Salmon River spring-run Chinook salmon counts have been conducted annually since 1980. In the 32 years, 1980 to 2011, Salmon River spring-run Chinook salmon have averaged about 740 fish annually, ranging from 1593 fish in 2011, to 6 fish in 1983 (unpublished Klamath National Forest Salmon River dive data).

On the South Fork Trinity River, during the summer of 1964, La Faunce (1967), as cited in Hillemeier (1993), estimated the spring-run Chinook salmon population to be 11,604 fish. In the 16 years between 1989 and 2004, South Fork Trinity River counts of adult spring-run Chinook salmon averaged 290 fish annually, ranging from 1,097 fish in 1996, to 7 fish in 1989 (CDFG 2004a in USDA Forest Service 2008). During this same time period (1989-2004), Salmon River spring-run Chinook salmon have averaged 681 fish annually, ranging from 1,300 fish in 1993, to 148 fish in 1990 (Figure 3). The low number of spring-run Chinook salmon is largely a response to the 1964 flood, which triggered landslides that filled in holding pools and covered spawning beds (Moyle 2002).

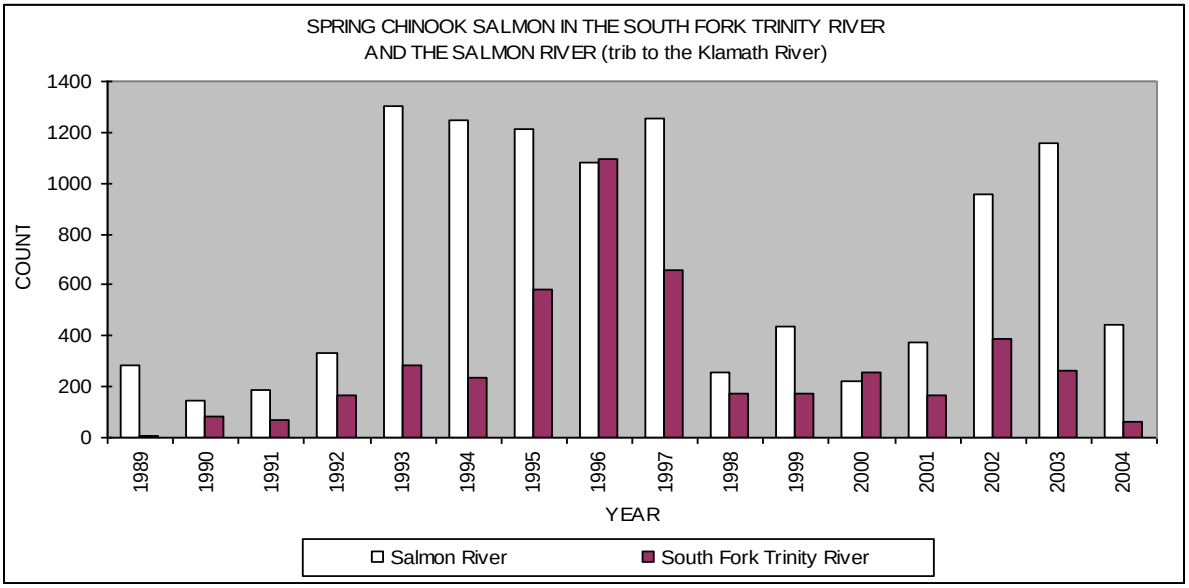


Figure 3. Adult Spring-Run Chinook Salmon Counts for the Salmon River (Klamath River) and the South Fork Trinity River, 1989-2004. (Sources: Klamath National Forest Unpublished Salmon River Dive Data, CDFG 2004)

5. Effects of the Project

Alternative 1 – No Action Alternative

With no prescribed burning activities, no trail and fireline maintenance, and no danger tree removal there would be no direct effects to fish species or aquatic habitat. Watershed and aquatic habitat conditions would continue to respond to climatic and other environmental changes and would continue to recover from past flood and fire events until reset by future natural events such as wildfire. The no-action alternative would not directly affect fish habitat components including stream shade, water temperature, sedimentation rates or large woody debris.

The no-action alternative may cause indirect effects to fish and their habitat because the project area would be at a higher risk of high severity wildfire. If a high severity wildfire occurred, it could have adverse impacts to watersheds and streams. Adverse effects of a wildfire would include creation of hydrophobic soils, post-fire increased soil erosion, increased water runoff, decreased lag time, and increased peak flows. These conditions result in disrupted channel maintenance processes, increased sediment delivery to stream channels and degraded aquatic habitat through pool filling, loss of spawning habitat and poor water quality. Post-fire sedimentation would likely be chronic until vegetation and soil recovery occurred. Widespread removal of riparian reserve vegetation from a high severity fire would reduce future large wood recruitment, reduce stream shade and increase stream water temperatures until riparian vegetation was re-established.

Alternatives 2 and 3 – Action Alternatives

Alternative 3 includes all of the treatments proposed under Alternative 2, plus an additional 2,379 acres. The additional acreage occurs on three sub-ridges on the west side of Virgin Creek. Alternatives 2 and 3 are analyzed together because potential effects to fish species from both action alternatives are very

similar. Alternative 2 would have slightly less negative impacts than Alternative 3 because of fewer acres treated. Likewise, any beneficial effects would be slightly less in Alternative 2 because of fewer acres treated.

Direct Effects

There would be no direct or immediate effects, or impacts, to fish species, because proposed actions do not occur within aquatic habitats including streams, springs, seeps or lake waters, and are limited within designated riparian reserves. Proposed actions also do not alter aquatic species habitat access.

Indirect Effects

The Fisheries BA/BE summarizes the current and post-project expected future baseline conditions for each project element in the Trinity Alps Wilderness Prescribed Fire project. Matrix summaries of the existing environmental baseline and effects of Project Elements for each 7th-field sub-watershed within the action area are displayed in Appendix E of the BA/BE. Existing conditions and effects were rated using the matrix criteria in Appendix A of this document. Each of the three project elements was analyzed for its effect on habitat indicators that are used to characterize the health of aquatic habitat. Changes to a habitat indicator were evaluated using factor analysis to determine if there would be project effects to individuals of the species or their habitat. The following summarizes potential effects of the Trinity Alps Wilderness Prescribed Fire project by Project Element. For a more detailed discussion of project effects to fish species by habitat indicator, please refer to the Fisheries BA/BE.

Effects of Prescribed Fire Treatments

Small amounts of sediment are expected to reach intermittent and perennial streams within the project area due to prescribed fire treatments. Because most burn units are located along ridgetops and occur in upslope areas, sediment reaching stream channels is most likely to be in headwater areas upstream from fish-bearing waters. More than 90% of the areas proposed for prescribed fire treatments are predicted to burn at low severity, which allows for retention of soil cover and reduces erosion potential. Additionally, prescribed fire treatments are designed to meet forest soil ground cover requirements in treated areas and implementation of BMPs will minimize accelerated erosion. Fine sediment exposed by prescribed fire is expected to be washed downslope during the first few post-burn precipitation events large enough to cause runoff from hillslopes. Most fines would settle out in vegetation and duff but some may be delivered to stream channels during storm events. Growth of herbaceous vegetation during the first growing season after prescribed fire treatments would further reduce the risk of sediment delivery to stream channels.

Prescribed burning may increase sediment yield at the site scale in the short-term; however, it is expected to have negligible effects to fish habitat indicators such as suspended sediment, substrate character and embeddedness. In context of existing instream habitat conditions, sediment and turbidity-related effects of the project will be of low magnitude and of a quantity that could not be meaningfully measured or evaluated. In the long term, the potential for controlling future higher severity wildfire would be increased; this may have a long-term benefit for spawning habitat and water quality for Chinook salmon, steelhead and rainbow trout.

Because of high stream gradients and transport reaches in project area sub-watersheds, it is unlikely that streams will show any impacts to pool frequency, pool quality, the number of large pools and thus rearing habitat and refugia due to prescribed fire treatments. The small amounts of fine sediment that may enter stream channels would likely stay suspended and be transported immediately downstream.

Since project implementation would be distributed spatially and temporally, the amount of fine sediment generated by prescribed burning and entrained into the stream system is expected to be minor and dispersed and undetectable from existing levels of instream fines. Any changes in the sediment regime due to prescribed burning activities are not expected to result in meaningful or detectable effects to pool habitat, rearing habitat or refugia. Effects are expected to be negligible at both the site and watershed scales.

Riparian reserves within the project area are rated as properly functioning. Typically in the project area, riparian reserves are characterized by steep draws with higher humidity levels and lower exposure to direct sunlight due to shading from topographic features and vegetation than surrounding upland areas. Only low-severity backing fire would be allowed to enter riparian reserve designations, which would minimize the disturbance or consumption of the fine organic component, would maintain adequate soil cover and would maintain soil porosity levels. Significant levels of live vegetation and larger sized dead vegetation in riparian reserves are not expected to be consumed because live and dead fuel moisture is higher adjacent to streams. In a study by Beche et al. (2005), low- to moderate-severity fire did not measurably change riparian canopy cover and the patchy behavior of prescribed fire along with moisture levels in the riparian zone served as an effective barrier from fire reaching the stream. Riparian reserves would retain their ability to filter excessive sediment and stabilize stream channels post-project. Additionally, prescribed burn prescriptions are designed to retain large woody debris (LWD) (> 12 inches in diameter), both standing and downed, in riparian reserves within a range to meet historical levels. Low-severity fire backing downslope into riparian reserves will not burn hot enough or long enough to consume existing instream LWD and will not reduce future LWD recruitment.

Due to the low intensity of fire allowed to back into riparian areas there will be no effect to thermal regulation, nutrient filtering, surface erosion, bank erosion, and channel migration, or large woody debris as the integrity of riparian buffer areas would be maintained and prescribed fire treatments will not alter riparian functions. Prescribed fire treatments in riparian reserves are expected to minimize the risk of future extreme fire behavior in riparian habitats. Due to resource protection measures and implementation of BMPs, the integrity of both riparian areas and stream channels will be protected from adverse direct and indirect effects of proposed actions. There is a discountable probability that the project will lead to measureable negative impacts to riparian reserves and high probability that the project will reduce potential future impacts to riparian reserves from wildfires.

Flow effects resulting from lower severity prescribed burning, as proposed for this project, are difficult if not impossible to detect (Baker 1990). With predominantly low severity prescribed fire there would not be enough of a decrease in vegetative cover to cause measurable changes to peak/base flows. Excessive surface runoff is not expected, and there would be adequate residual trees and vegetation to provide root strength and to use excess groundwater so soil stability would be largely maintained. In addition, project design criteria are expected to be effective in minimizing effects to the hydrologic function of project area sub-watersheds.

Because fire is a natural watershed disturbance in this area, native species are adapted to persist under the natural fire regimes and associated watershed conditions. Although aquatic species may be exposed to slight increases in turbidity and fine sediment during storms post-project, there is low probability that the amount generated from project actions would adversely affect patterns of migration, reproduction, or rearing. In context of existing aquatic habitat conditions, sediment and turbidity-related effects of the project would be of low magnitude and of a quantity that could not be meaningfully measured or evaluated.

Effects of Trail and Fireline Maintenance and Danger Tree Removal

Trail and fireline maintenance and danger tree removal would not generate accelerated erosion rates and will have no sediment-related effects to fish species or their habitats because of the extremely limited extent of these actions associated with the Project. Clearing overgrown vegetation by slashing brush, hand pruning, moving aside large downed wood or felling a danger tree does not pose surface erosion concerns because the small amounts of vegetation removed would not alter soil stability or cause ground or soil compaction or impervious surfaces, and ground cover would not be removed to the extent where the erosion hazard would be increased. Waterbarring existing firelines is a resource protection measure included in the proposed action to prevent excessive soil erosion during rainfall events and is expected to dissipate run-off and surface fines from mobilizing to a level that could reach a stream channel. Waterbars also remove the potential for these features to be hydrologically connected to stream channels. Surface derived sediment from these activities is considered very short-term in duration (one rainy season following activities), and is expected to be minor and dispersed, and undetectable from background levels. Additionally, the extremely small levels of disturbance associated with these actions have no probability of increasing overall run-off or the timing of run-off at the subwatershed at watershed scales and will not influence flow magnitude or timing. Because trail and fireline maintenance and danger tree removal have no sediment-related effects to fish species or their habitats, there are no causal mechanisms for effects to instream habitat conditions such as pool frequency, pool quality, substrate character, embeddedness, turbidity, or water quality.

Both trail and fireline maintenance and danger tree removal do not change or influence existing conditions in riparian reserves on a subwatershed or watershed scale. Trail and fireline maintenance consists of hand brushing and pruning actions along existing features that may cross riparian reserves. These actions would not change the width or length of trails or firelines that may already exist in riparian reserve designations, nor will they affect existing LWD or trees that could potentially become LWD in the future. The integrity of riparian buffer areas would be maintained along with key functions of riparian reserves. Danger trees will be avoided where possible and would only be felled where the tree poses a hazard to fire personnel. It is highly unlikely a danger tree would need to be felled within a riparian reserve designation but if this is necessary, the tree would remain onsite to provide benefits to the functioning of the riparian zone.

Cumulative Watershed Effects

Reasonably foreseeable future and ongoing federal actions that should be included in the cumulative effects analysis for the project include hiking/backpacking, recreational pack stock grazing, and appropriate responses for fire suppression. There are no other projects planned or proposed within the project area.

The cumulative watershed effects were modeled for the Trinity Alps Wilderness Prescribed Fire project using three models: surface erosion (USLE model), mass wasting erosion (GEO model) and overall watershed condition (ERA model). Results of CWE modeling for sediment show the aggregated effects of proposed actions do not increase the risk of sediment delivery near or above thresholds of concern due to the low intensity of proposed treatments (see the Project Soil/Geology/Hydrology Report).

Pre-project and post-project surface erosion values (USLE model) are extremely low for all 7th-field sub-watersheds and modeled increases due to the Project do not approach levels that would cause adverse impacts in any sub-watershed. Normal (average severity) rainfall events following prescribed burning activities are expected to slightly increase the sediment yield of treated sub-watersheds during the first

year post-burn. Substantial recovery toward existing conditions would occur in year 1 and return to near pre-project levels within 3 years (in the absence of other disturbances).

Low severity fire is assumed to have no effect on landslide potential (GEO model) because it removes only smaller understory vegetation, and has a negligible effect on root support and slope hydrology. Since proposed prescribed fire treatments are predominantly low severity burning of understory vegetation and forest floor litter, the proposed action is not expected to result in increased mass wasting or debris flow activity above existing rates. The project is expected to result in reduced risk ratios over the long term by reducing the severity of wildfires should they occur.

The ERA model is used to estimate the current sensitivity of Project sub-watersheds, and indicates if changes to flows would occur post-project. ERA values for all 7th-field sub-watersheds are well below the threshold of concern value of 1.0, with most drainages having post-project ERA values below 0.50. These values show a discountable probability that flows would be measurably affected by the project (see the Project Soil/Geology/Hydrology Report). Project actions are not likely to change the runoff response in project area watersheds and are not expected to increase peak/base flows by a detectable level.

The resource protection measures and Best Management Practices to be implemented for proposed actions are expected to minimize disturbance to hydrologic resources, water quality and anadromous fish habitat in the project area to a negligible level. These features are designed to minimize project-generated erosion and sediment delivery to aquatic habitats, both within and downstream of the project area.

The potential for the Trinity Alps Wilderness Prescribed Fire project to contribute to cumulative effects is considered low, as the duration of potential effects, in particular sedimentation, to instream and riparian habitat is expected to be short-term and discountable. The eight 7th field watersheds within the project area have either minor or no increases in risk ratios due to proposed prescribed fire, and values remain well below threshold. The minor increase is expected to be short-term until vegetative recovery occurs. Further, prescribed burning would reduce the severity of effects of a future wildfire, should it occur, and future cumulative effects from fires in these watersheds.

Management Indicator Analysis Summary

Activities proposed under Alternatives 2 and 3, including prescribed burning, fireline and trail maintenance and danger tree removal would have an overall neutral effect on aquatic habitat indicators. These actions are not expected to introduce measurable instream fine sediment into perennial stream reaches where Chinook salmon, steelhead and rainbow trout occur. Baseline conditions for all instream habitat elements would be maintained including substrate character, embeddedness, pool frequency, pool quality, width to depth ratio, and streambank condition.

There are no expected measurable changes to physical channel or habitat conditions from the activities proposed in either of the action alternatives including water quality, flow hydrology, and riparian reserve function. The long-term trend would be a slight improvement in overall riparian and aquatic conditions in the action area because of the reduced threat of high severity wildfire in the watershed.

Although project implementation would result in slight changes to components of assemblage habitats such as substrate and turbidity, project area streams would continue to provide the same quantity and distribution of fisheries indicator assemblage habitats post project. Thus, the project is not likely to

result in any meaningful change to population trends and habitat availability for Chinook salmon, steelhead or rainbow trout.

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Appendix A

Matrix of Factors and Indicators as Modified for the Shasta-Trinity National Forest

This matrix shows criteria used to determine baseline conditions in 7th and 5th field watersheds. Modifications agreed to by Level 1 representatives Allen Taylor (NMFS) and Loren Everest (USFS) on March 3, 2006.

Diagnostic or Pathway	Indicators	Properly Functioning	Functioning at Risk	Not Properly Functioning
HABITAT:				
Water Quality:	**Temperature**[1] 1st - 3rd Order Streams [instantaneous]	67 F degrees or less	> 67 to 70 degrees F	> 70 degrees F
	4th-5th Order Streams [7 Day Mean Maximum]	70 degrees F or less	> 70 to 73 degrees F	> 73 degrees F
	Suspended Sediment - Intergravel Dissolved Oxygen/Turbidity[2]	Similar to Chinook salmon: for example (e.g.): < 12% fines (<0.85mm) in gravel; e.g., ≤12% surface fines of ≤6mm. Turbidity Low	Similar to Chinook salmon: e.g., 12-17% fines (<0.85mm) in gravel; e.g., 12-20% surface fines of ≤6mm. Turbidity Moderate	Similar to Chinook salmon: e.g., >17% fines (<0.85mm) in gravel; e.g., >20% surface fines of ≤6mm. Turbidity High
	Chemical Contamination/ Nutrients[3]	Low levels of chemical contamination from agricultural, industrial and other sources, no excess nutrients, no CWA 303d designated reaches due to chemical or nutrient contamination.	Moderate levels of chemical contamination from agricultural, industrial and other sources, some excess nutrients, one CWA 303d designated reach due to chemical or nutrient contamination.	High levels of chemical contamination from agricultural, industrial and other sources, high levels of excess nutrients, more than one CWA 303d designated reach due to chemical or nutrient contamination.
Habitat Access:	**Physical Barriers**[4] *The intent of this variable is to evaluate passage barriers to all life stages.	No human-made barriers present in watershed.	One or more human-made barriers present in watershed do not allow upstream and/or downstream fish passage at base/low flows.	Human-made barriers present in watershed do not allow upstream and/or downstream fish passage at a range of flows for at least one life history stage.

Diagnostic or Pathway	Indicators	Properly Functioning	Functioning at Risk	Not Properly Functioning
Habitat Elements:	**Substrate Character and /Embeddedness (in areas of the gravels and subsurface areas)**[5] *The intent of this is to evaluate habitat quality for rearing.	Less than 15% fines (<2 mm) in spawning habitat (pool tail-outs, low gradient riffles, and glides) and cobble embeddedness less than 20%.	15% to 20% fines (<2 mm) in spawning habitat (pool tail-outs, low gradient riffles, and glides) and/or cobble embeddedness is 20% to 25%.	Greater than 20% fines (<2 mm) in spawning habitat (pool tail-outs, low gradient riffles, and glides) and cobble embeddedness greater than 25%.
	Large Woody Debris[6]	More than 40 pieces of large wood (>16 inches in diameter and > 50 feet in length) per mile AND current riparian vegetation condition near site potential for recruitment of large woody debris.	40 to 20 pieces of large wood (>16 inches in diameter and > 50 feet in length) per mile OR current riparian vegetation condition below site potential for recruitment of large woody debris.	Less than 20 pieces of large wood (>16 inches in diameter and > 50 feet in length) per mile AND current riparian vegetation condition well below site potential for recruitment of large woody debris.

Diagnostic or Pathway	Indicators	Properly Functioning	Functioning at Risk	Not Properly Functioning
	Pool Frequency and Quality[4]	Pool frequency in a reach closely approximates the frequency values listed below and large woody debris recruitment standards for properly functioning habitat (above); pools have good cover and cool water, and only minor reduction of pool volume by fine sediment. **channel width # pools/mile** 5 feet 184 10 " 96 15 " 70 20 " 56 25 " 47 50 " 26 75 " 23 100 " 18	Pool frequency is similar to values listed in "functioning appropriately", but large woody debris recruitment is inadequate to maintain pools over time; pools have inadequate cover/temperature, and/or there has been a moderate reduction of pool volume by fine sediment.	Pool frequency is considerably lower and does not meet values listed for "functioning appropriately"; also cover/temperature is inadequate, and there has been a major reduction of pool volume by fine sediment.
	Large Pools[4] (in adult holding, juvenile rearing, and overwintering reaches where streams are >3m in wetted width at baseflow)	Each reach has many large pools >1 meter deep.	Reaches have few large pools (>1 meter) present.	Reaches have no deep pools (>1 meter).
	Off-channel Habitat[7] (evaluated for stream types that are not naturally entrenched)	Watershed has many ponds, oxbows, backwaters, and other off-channel areas with cover; and side-channels are low energy areas.	Watershed has some ponds, oxbows, backwaters, and other off-channel areas with cover; but side-channels are generally high energy areas.	Watershed has few or no ponds, oxbows, backwaters, or other off-channel areas.

Diagnostic or Pathway	Indicators	Properly Functioning	Functioning at Risk	Not Properly Functioning
	Refugia[4]	Habitats capable of supporting strong and significant populations are protected (e.g., by intact riparian reserves or conservation areas, ground water upwelling areas, and seeps); and are well distributed and connected for all life stages and forms of the species.	Habitats capable of supporting strong and significant populations are insufficient in size, number and connectivity to maintain all life stages and forms of the species.	Adequate habitat refugia do not exist.
Channel Condition & Dynamics:	**Average Wetted Width/ Maximum Depth Ratio in scour pools in a reach**[8]	W/D ratio < 12 on all reaches that could otherwise best be described as 'A', 'G', and 'E' channel types. W/D ratio > 12 on all reaches that could otherwise best be described as 'B', 'F', and 'C' channel types. No braided streams formed due to excessive sediment load	Less than 25% of the surveyed reaches are outside of the ranges given for Width/Depth ratios for the channel types specified in "Properly Functioning" block. Braiding has occurred in some alluvial reaches because of excessive aggradation due to high sediment loads.	More than 25% of the reaches are outside of the ranges given for Width/Depth ratios for the channel types specified in "Properly Functioning" block. Braiding has occurred in many alluvial reaches as a result of excessive aggradation due to high sediment loads
	Streambank Condition[9] (Based on USFS Region 5 Stream Condition Inventory Survey Methods)	> 90% stable; i.e., on average, < 10% of banks are actively eroding.	80% - 90% stable	< 80% stable

Diagnostic or Pathway	Indicators	Properly Functioning	Functioning at Risk	Not Properly Functioning
	Floodplain Connectivity[4]	Off-channel/side channel areas are frequently hydrologically linked to main channel; overbank flows occur and maintain wetland functions, riparian vegetation, and succession.	Reduced linkage of wetland, floodplains and riparian areas to main channel; overbank flows are reduced relative to historic frequency, as evidenced by moderate degradation of wetland function, riparian vegetation, and succession.	Severe reduction in hydrologic connectivity between off-channel/side channel, wetland, floodplain and riparian areas; wetland extent drastically reduced and riparian vegetation, and succession altered significantly.
Flow/ Hydrology:	**Change in Peak/ BaseFlows**[10]	Watershed is in condition class I according to the STNF Cumulative Watershed Effects (CWE) model. Watershed exhibits high hydrologic integrity relative to its natural potential condition.	Watershed is in condition class II according to the STNF CWE model. Watershed exhibits moderate hydrologic integrity relative to its natural potential condition.	Watershed is in condition class III according to the STNF CWE model. Watershed exhibits low hydrologic integrity relative to its natural potential condition.
	Increase in Drainage Network[4]	Zero or minimum increases in active channel length correlated with human caused disturbance (e.g., trails, roadside ditches, compaction, impervious surface, etc).	Low to moderate increase in active channel length correlated with human caused disturbance (e.g., trails, roadside ditches, compaction, impervious surface, etc).	Greater than moderate increase in active channel length correlated with human caused disturbance (e.g., trails, roadside ditches, compaction, impervious surface, etc).
Watershed Conditions:	**Road Density & Location**[4]	Salmon and Steelhead: <2 mi/mi^2	Salmon and Steelhead: 2-3 mi/mi^2	Salmon and Steelhead: >3 mi/mi^2

Diagnostic or Pathway	Indicators	Properly Functioning	Functioning at Risk	Not Properly Functioning
	Disturbance History[10] (Based on STNF ERA modeling)	CWE model shows that the watershed is in Condition Class 1. Clarify and verify conditions and risk through field reviews and/or other available info, as available. The watershed contains 15% or more Late Successional Old Growth habitat[11].	CWE model shows that the watershed is in condition class 2. Clarify and verify conditions and risk through field reviews and/or other available info, as available. The watershed contains 15% or more Late Successional Old Growth habitat11.	CWE model shows that the watershed is in condition class 3. Clarify and verify conditions and risk through field reviews and/or other available info, as available. The watershed contains less than 15% Late Successional Old Growth habitat[11].
	Riparian Reserves - Northwest Forest Plan[4]	Adequate shade, large woody debris recruitment, and habitat protection and connectivity in subwatersheds, and buffers or includes known refugia for sensitive aquatic species (>80% intact), and adequately buffer impacts on rangelands: percent similarity of riparian vegetation to the potential natural community/ composition >50%.	Moderate loss of connectivity or function (shade, LWD recruitment, etc.) of riparian conservation areas, or incomplete protection of habitats and refugia for sensitive aquatic species (70-80% intact), and adequately buffer impacts on rangelands: percent similarity of riparian vegetation to the potential natural community/composition 25-50% or better.	Areas are fragmented, poorly connected, or provide inadequate protection of habitats for sensitive aquatic species (<70% intact, refugia does not occur), and adequately buffer impacts on rangelands: percent similarity of riparian vegetation to the potential natural community/composition <25%.

Diagnostic or Pathway	Indicators	Properly Functioning	Functioning at Risk	Not Properly Functioning
	Disturbance Regime[4]	Environmental disturbance is short lived; predictable hydrograph, high quality habitat and watershed complexity providing refuge and rearing space for all life stages or multiple life-history forms. Natural processes are stable.	Scour events, debris torrents, or catastrophic fire are localized events that occur in several minor parts of the watershed. Resiliency of habitat to recover from environmental disturbances is moderate.	Frequent flood or drought producing highly variable and unpredictable flows, scour events, debris torrents, or high probability of catastrophic fire exists throughout a major part of the watershed. The channel is simplified, providing little hydraulic complexity in the form of pools or side channels. 1Natural processes are unstable.
SPECIES AND HABITAT				
Species and Habitat:	**Summary/Integration of all Species and Habitat Indicators**[4] *This is intended to be a summary statement for narrative describing an overall rating for the population and habitat indicators. The statements in the columns are examples not criteria.	Bull Trout Example Habitat quality and connectivity among sub-populations is high. The mig-ratory form is present. Distur-bance has not altered channel equilibrium. Fine sediments and other hab-itat character-istics influencing survival or growth are consistent with pristine habitat. The sub-pop-ulation has the resilience to recover from short-term dis-turbance within one to two gen-erations (5 to 10 years).	Bull Trout Example Fine sediments, stream temperatures, or the availability of suitable habitats have been altered and will not recover to pre-disturbance conditions within one generation (5 years). Survival or growth rates have been reduced from those in the best habitats. The subpopulation is reduced in size, but the reduction does not represent a long-term trend. The subpopulation is stable or fluctuating in a downward trend.	Bull Trout Example Cumulative disruption of habitat has resulted in a clear declining trend in the subpopulation size. Under current management, habitat conditions will not improve within two generations (5 to 10 years). Little or no connectivity remains among subpopulations. The subpopulation survival and recruitment responds sharply to normal environmental events.

Footnotes to Trinity River tributaries matrix of factors and indicators

The Streamlined Consultation Procedures for Section 7 of the Endangered Species Act, July 1999 page IV-A-1 encouraged Level 1 teams to adapt the general matrix, as necessary, to reflect local geographic and climactic influences. It added that "… Level 1 teams may add, delete, or modify pathways and/or indicators, as necessary, to address particular life history and/or habitat requirements of fish species or life stages being considered by the team." In June of 2004 the Shasta Trinity National Forest Level1 team adopted the Shasta Trinity National Forest Matrix of factors and indicators, in which some indicators had values changed based on locally applicable reference conditions, some indicators dropped the original models in favor of Region 5 models and some indicators were dropped due to redundancies. The Analytical Process for developing Biological Assessments for Federal Actions Affecting Fish within the Northwest Forest Plan Area (AP) (USDA and USDI 2004) contains an updated version of the original Matrix of Pathways and Indicators (Matrix). The 2004 Matrix contains direction that "All indicators must be evaluated; however, criteria values presented here are not absolute and may be adjusted for local watersheds given supportive documentation." The following footnotes represent the supportive documentation for adjusting criteria values of the 2004 AP Matrix to the upper Trinity River geographical area and to Cumulative Watershed Effects models currently in use on the Shasta Trinity National Forest.

(1) **Stream Order according to Strahler (1957).** Proper Functioning criterion for 4th/5th Order streams derived from temperature monitoring near the mouth of streams considered to be pristine or nearly pristine (North Fork Trinity and New Rivers - 5th order, East Fork North Fork Trinity and New Rivers near East Fork- 4th order (Data on file at the Weaverville Ranger District). 7 day maximum temperatures as high as 71.8 degrees F have been recorded on these streams, however, the average is just less than 70 degrees F. At Risk criterion for 4th/5th order streams derived from monitoring in streams that support populations of anadromous fish, although temperatures in this range (70 to 73.0 degrees F) are considered sub-optimal. Not Properly Functioning is sustained temperatures above 73.0 degrees F that cause cessation of growth and approach lethal temperatures for salmon and steelhead.

Properly Functioning criterion for 1st - 3rd order streams is derived from Proper Functioning criterion for 3rd order streams derived from temperature monitoring near the mouth of streams considered to be pristine or nearly pristine (Devils Canyon Creek, East Fork New River, Slide Creek, and Virgin Creek). At Risk and Not Properly Functioning are assigned on a temperature continuum with values given for 4th/5th order streams, with the maximum instantaneous temperature of At Risk of 1st - 3rd order streams coinciding with the minimum 7 day maximum of 4th/5th order At Risk streams. Similarly for the Not Properly Functioning category.

(2) Criteria unchanged from USDA et al. 2004. Turbidity levels are further defined below:

Properly Functioning: Water clarity returns quickly (within two days) following peak flows.

At Risk: Water clarity slow to return following peak flows.

Not Properly Functioning: Water clarity poor for long periods of time following peak flows. Some suspended sediments occur even at low flows or baseflow.

(3) Criteria unchanged from USDA et al. 2004. The language for CWA303d listing was clarified to exclude reaches listed due to sediment.

(4) Criteria unchanged from USDA et al. 2004.

(5) Criteria based on interpretation of Figure 4.13 from Bjornn and Reiser. 1991. The STNF feels that cobble embeddedness is a highly variable measure and that quantifying surface fine sediment is a more repeatable measure for analyzing substrate character. Literature is readily available to link fine sediment levels to the health of salmonids.

Properly functioning: <15% fine sediment >80% emergence of salmonids.

At Risk: 15%-20% fine sediment >50% emergence of salmonids

Not properly functioning: >20% fine sediment < 50% emergence of salmonids.

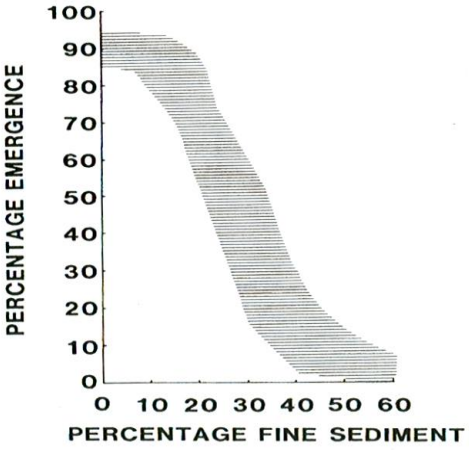

Figure 4.13 Percentage of swim-up fry placed in gravel sand mixtures in relation to the percentage of sediment smaller than 2-6.4mm in studies by Bjornn (1968), Phillips et al. (1975), Hausle and Coble (1976), and McCuddin (1977). The stippled area includes data from eight tests on Brook trout, steelhead, and Chinook and coho salmon.

(6) **Properly Functioning LWD** criteria derived from stream surveys of 25 stream reaches on the Trinity River Management Unit. Reaches used to define properly functioning condition currently or historically supported anadromous fish, have had minimal timber harvest, and stream channels were not cleaned during historical mining. Criteria for LWD recruitment potential is based on professional judgment of Loren Everest, STNF west zone fishery biologist.

(7) Criteria unchanged from USDA et al. (2004), however channel type clarification added to address local conditions. Based on Rosgen (1996).

(8) Width to depth (W/D) ratio for various channel types is based on delineative criteria of Rosgen (1996). Properly Functioning means that W/D ratio falls within expected channel type as determined by the other four delineative factors (entrenchment, sinuosity, slope, and substrate). Aggradation on alluvial flats causing braiding is well known phenomenon that often accompanies changes in W/D ratio as watershed condition deteriorates. At Risk and Not Properly Functioning levels are determined by professional judgment based on observation of streams on the west side of the Shasta-Trinity National Forest.

(9) USDA Forest Service 1998.

(10) Shasta Trinity National Forest uses Equivalent Roaded Area/Threshold of Concern (ERA/TOC) Model (Haskins 1986) to determine the existing risk ratio as well as the effect risk ratio. Therefore, the ECA values are not used in Region 5 analysis; instead the ERA/TOC model is used. ERA/TOC provides a simplified accounting system for tracking disturbances that affect watershed processes, in particular, estimates in changes in peak runoff flows influenced by disturbance activities. This model is not intended to be a process-based sediment model; however it does provide an indicator of watershed conditions. This model compares the current level of disturbance within a given watershed (expressed as %ERA) with the theoretical maximum disturbance level acceptable (expressed as %TOC). ERA/TOC (or

"risk ratio") estimates the level of hydrological disturbance or relative risk of increased peak flows and consequent potential for channel alteration and general adverse watershed impacts. TOC is calculated based on channel sensitivity, beneficial uses, soil erodibility, hydrologic response, and slope stability. The TOC does not represent the exact point at which cumulative watershed effects will occur. Rather, it serves as a "yellow flag" indicator of increasing susceptibility for significant adverse cumulative effects occurring within a watershed.

Susceptibility of CWE generally increases from low to high as the level of land disturbing activities increase towards or past the TOC (FS Handbook, 2509.22-23.63a).

CWE Analysis Threshold of Concern and Watershed Condition Class: The Environmental Impact Statement for the Shasta Trinity National Forest Land and Resource Management Plan (USDA Forest Service, 1994) established TOC for 5th field watersheds and defines Watershed Condition Class (WCC). The WCC are defined as follows:

Watershed Condition Class I: ERA less than 40 percent TOC;

Watershed Condition Class II: ERA between 40 and 80 percent TOC; and

Watershed Condition Class III: ERA greater than 80 percent TOC.

The following summarizes the FSM 2521.1 - Watershed Condition Classes. The ERA evaluates watershed condition and assigns one of the following three classes:

1. Class I Condition. Watersheds exhibit high geomorphic, hydrologic, and biotic integrity relative to their natural potential condition. The drainage network is generally stable. Physical, chemical, and biologic conditions suggest that soil, aquatic, and riparian systems are predominantly functional in terms of supporting beneficial uses.

2. Class II Condition. Watersheds exhibit moderate geomorphic, hydrologic, and biotic integrity relative to their natural potential condition. Portions of the watershed may exhibit an unstable drainage network. Physical, chemical, and biologic conditions suggest that soil, aquatic, and riparian systems are at risk in being able to support beneficial uses.

3. Class III Condition. Watersheds exhibit low geomorphic, hydrologic, and biotic integrity relative to their natural potential condition. A majority of the drainage network may be unstable. Physical, chemical, and biologic conditions suggest that soil, riparian, and aquatic systems do not support beneficial uses.

(11) Late Successional Old Growth from Northwest Forest Plan, 1994. Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl. USDA Forest Service and USDI Bureau of Land Management.

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